

- ① Sketch a graph of  $f(x) = -|x+1|-2$ . Find the vertex, domain and range.
- ② Solve for  $x$  in problem #1 if  $f(x) = -38$  and  $f(x) = 14$
- ③ Solve for  $y$  in  $(y-3)^2 - 1 = x + 5$  and sketch a graph. Find domain, range, and the vertex.
- ④ If  $f(x) = x^2$ , sketch  $f(x-3)+1$  and  $-f(x)-3$

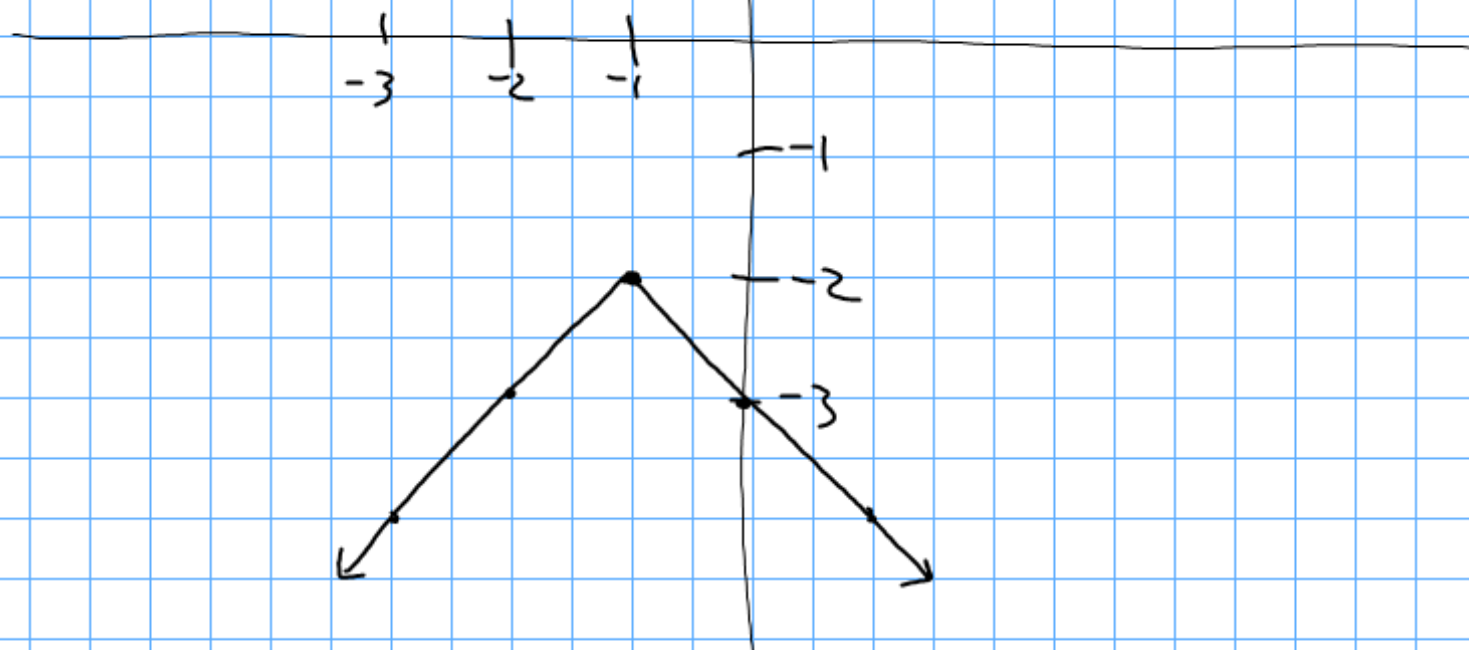
$$f(x) = -|x+1| - 2$$

Diagram illustrating the components of the function  $f(x) = -|x+1| - 2$ :

- The absolute value part  $|x+1|$  is shown with a V-shape opening upwards, labeled with a "+" above and a "-" below.
- The horizontal shift is indicated by an arrow pointing left from the vertex, labeled "left + 1".
- The vertical shift is indicated by an arrow pointing down from the vertex, labeled "2 down".

Domain:  $(-\infty, \infty)$   
x-values

Range:  $(-\infty, -2]$   
y-values



$$\begin{array}{r} -38 = -|x+1| - 2 \\ +2 \qquad \qquad +2 \end{array}$$

$$\begin{array}{r} -36 = -|x+1| \\ \hline -1 \quad -1 \end{array}$$

$$36 = |x+1|$$

$$\begin{array}{r} 36 = x+1 \\ -1 \quad -1 \end{array}$$

$$\boxed{35 = x}$$

$$\begin{array}{r} -36 = x+1 \\ -1 \quad -1 \end{array}$$

$$\boxed{-37 = x}$$

$$\begin{array}{r} 14 = -|x+1| - 2 \\ +2 \qquad \qquad +2 \end{array}$$

$$\begin{array}{r} 16 = -|x+1| \\ \hline -1 \quad -1 \end{array}$$

$$-16 = |x+1|$$

No Solution

$$-16 = x+1$$

$$\cancel{x = -17}$$

$$16 = x+1$$

$$\cancel{x = 15}$$

$$(y-3)^2 - 1 = x + 5$$

+1                      +1

$$\sqrt{(y-3)^2} = \sqrt{x+6}$$

$$y-3 = \pm \sqrt{x+6}$$

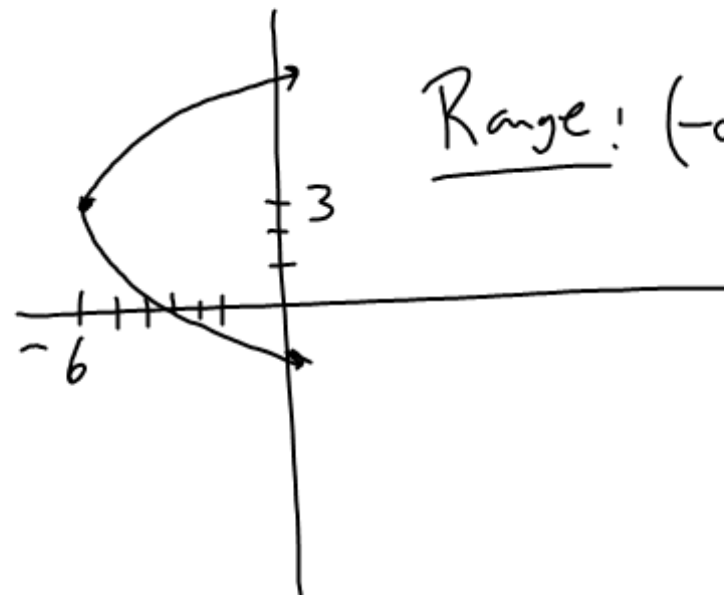
+3                      +3

$$y = \pm \sqrt{x+6} + 3$$

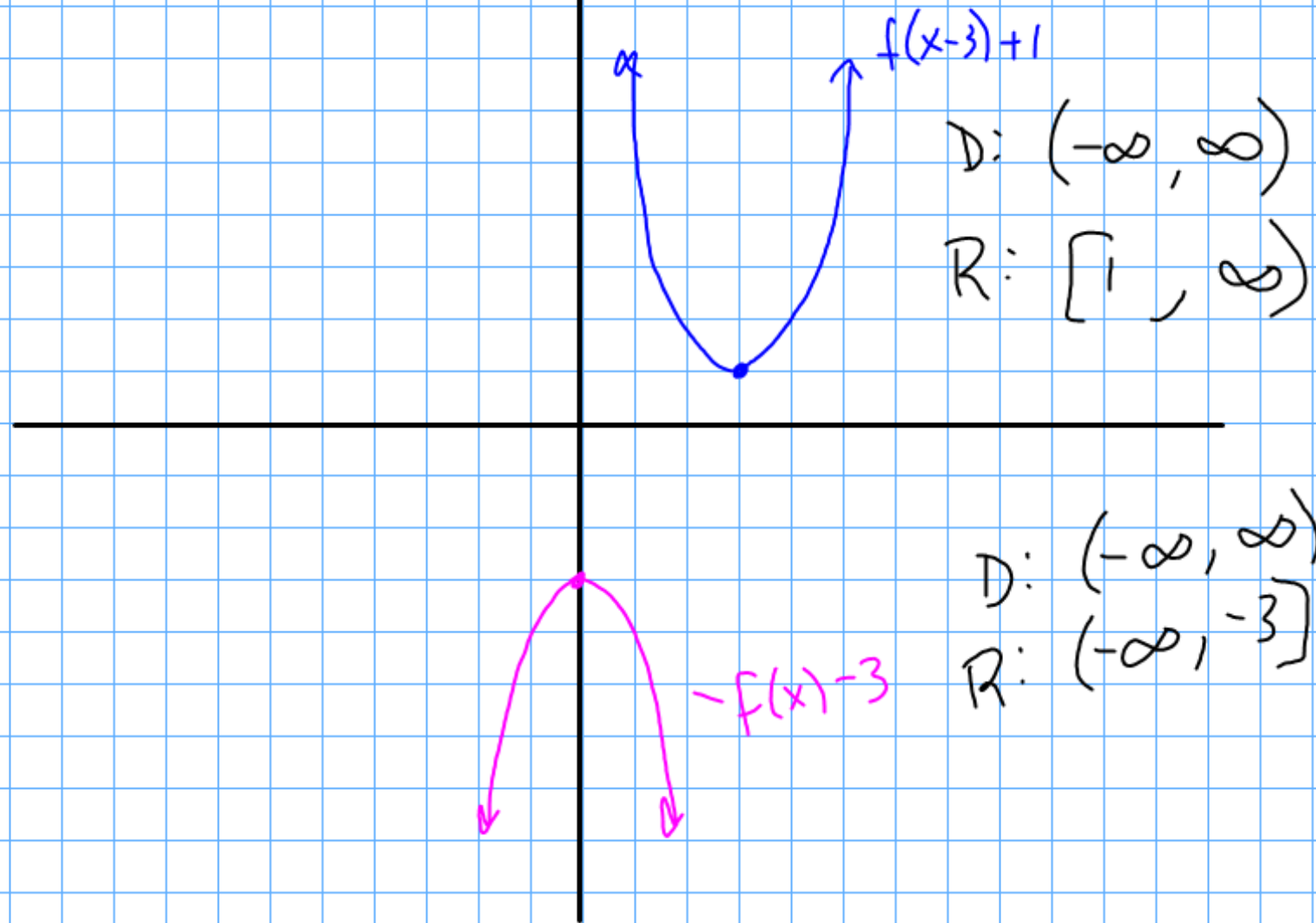
$\uparrow$                        $\uparrow$   
 $x+6$                        $y_p$

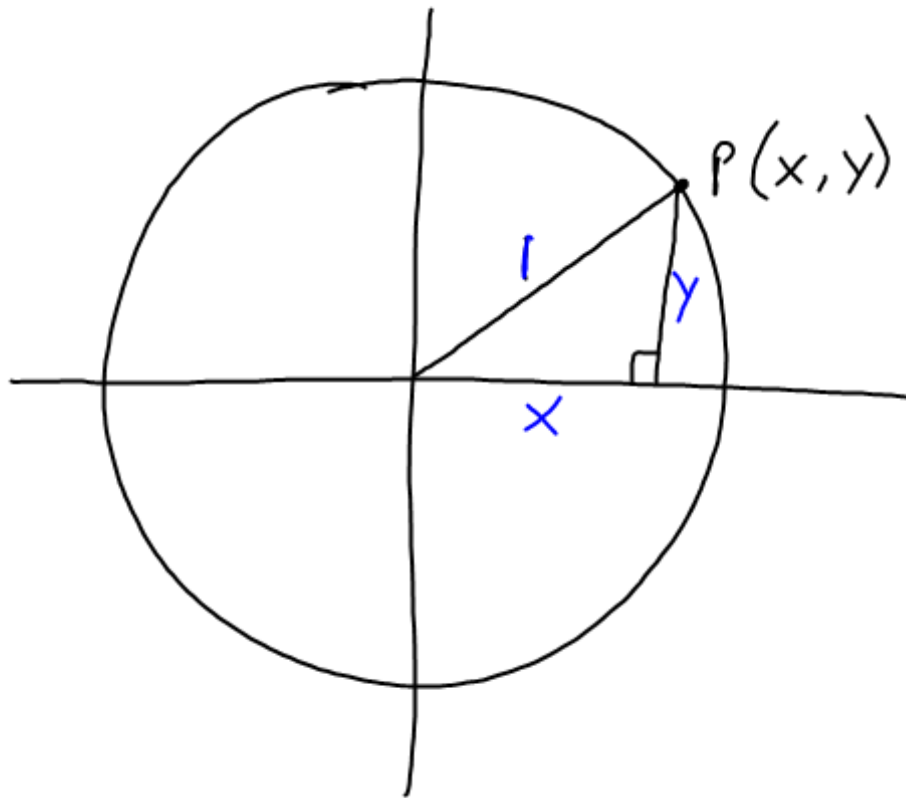
Domain:  $[-6, \infty)$

Range:  $(-\infty, \infty)$



$f(x) = x^2$ , sketch  $f(x-3)+1$  and  $-f(x)-3$





$$x^2 + y^2 = r^2$$

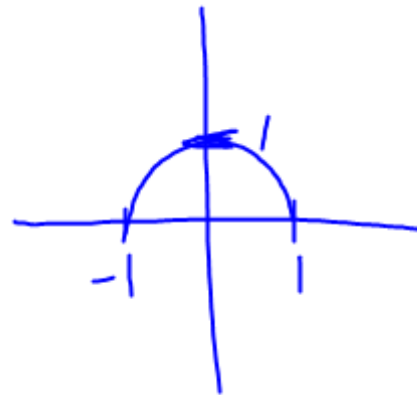
$$x^2 + y^2 = 1$$

$$-x^2 \quad -x^2$$

$$y^2 = 1 - x^2$$

$$y = \pm \sqrt{1 - x^2}$$

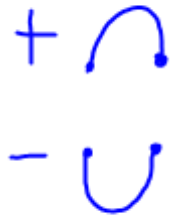
circle



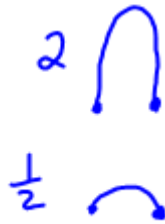
$$y = \sqrt{1 - x^2}$$

semi circle

$$f(x) = \pm a \sqrt{1 - \left(\frac{x-h}{c}\right)^2} + k$$



vert.  
stretch



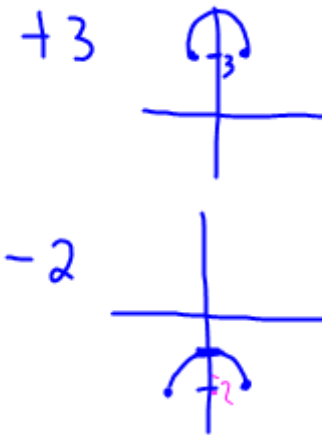
leave  
 $a$   
 $1$

$h$  is horz.  
shift

$$\sqrt{1 - (x+4)^2} \quad \leftarrow h+4$$

$$\sqrt{1 - (x-2)^2} \quad \rightarrow h-2$$

feet  
vert. shift



$c$  is horz.  
stretch

$$\sqrt{1 - (2x)^2}$$

$$\sqrt{1 - \left(\frac{x}{2}\right)^2}$$

5.7, p. 231

#1-12

